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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,927	09/26/2001	Wil McCarthy		2183

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EXAMINER	
PETKOVSEK, DANIEL J	
ART UNIT	**PAPER NUMBER**
2874	

DATE MAILED: 06/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,927	MCCARTHY ET AL.	
	Examiner DJP 6/6/05	Art Unit	
	Daniel J. Petkovsek	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *response/arguments filed May 12, 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6, and 9-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,6,9,10,13,14,16-18 and 20-25* is/are rejected.

7)☒ Claim(s) *3,4,11,12,15, and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *October 24, 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the arguments filed May 12, 2005. Claims 1-6, and 9-25 are pending.

Claim Rejections - 35 USC § 102/103

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 5, 6, 9, 10, 13, 14, 16-18, and 20-25 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yerushalmi et al. US 2003/0107927 A1.

Yerushalmi et al. US 2003/0107927 A1 teaches (Figs. 11, 14, 15; [0276]-[0278], [0334]) a device for producing quantum effects comprising: a material fashioned into an elongated fibrous shaped body 304, one of more control paths 308 that carry energy along said material, quantum dots (the Examiner interprets the reference to inherently use a plurality of these particles, since they would not provide particular functionality if only one individual QD were

modified) physically connected to said material and energetically connected to said control paths (see [0334]), wherein energy carried in said control paths 308 actuate the quantum dot to modulate properties thereof by trapping and holding a controlled configuration of charge carriers, which clearly, fully meets Applicant's *claimed* limitations.

In the alternative, if the term "quantum dot" is to be interpreted as a single QD in the reference to Yerushalmi et al. '927, the claim language is rejected under 35 U.S.C. 103(a). A person having ordinary skill in the art at the time the invention was made would have recognized the use of a plurality of the fibrous shaped synthetic molecular assemblies to control a plurality of quantum dots, for the purpose of improving the large scale functionality of the device as claimed. Using the device to control a number of quantum dots would improve efficiency, functionality, and decrease cost. Regarding claim 16, a plurality of the fibers need be arranged in a two or three-dimensional structure to support a plurality of quantum dots.

Regarding claims 2 and 18, the control paths 308 are conductive electrical wires.

Regarding claims 5 and 6, the quantum dots are both particles and have function (devices), in relation to the definition of quantum dots in the art.

Regarding claim 10, the control of the energy level of the quantum dots is the only control disclosed.

Regarding claim 13, a control path can comprise a single wire.

Regarding claim 14, polymer insulators are disclosed [0279].

Regarding claim 17, the fibrous shape is shaped *similar* to a wire.

Regarding claim 20, the control alters the electrical, optical, thermal, magnetic, mechanic, and/or chemical properties of said material.

Regarding claims 21 and 24, control paths can be coupled to respective quantum dot(s), and this electrical energy can be controlled.

Regarding claims 22, 23, and 25, although it is not explicitly taught to couple the control paths as a subset or to a grouping of quantum dots, it would have been obvious, at the time the invention was made, to a person having ordinary skill in the quantum field to couple control to a plurality of quantum dots instead of to one quantum dot, for the purpose of increasing functionality, utility, and to reduce cost by decreasing the number of control lines necessary. Decreasing the number of control lines will improve overall efficiency.

Regarding claim 9, although the prior art to Yerushalmi et al. '927 does not explicitly disclose a device wherein only the atomic number and energy level of the artificial atoms can be controlled, it would have been obvious, at the time the invention was made, to a person having ordinary skill in the art to achieve the desired result of controlling both the energy level (via actuation) and the atomic number, since one having ordinary skill in the art would have recognized that changing the atomic number of a quantum dot would change the electrical, optical, thermal, magnetic, mechanical, and/or chemical properties of the material. The change of these properties would solve the problems as disclosed by Yerushalmi et al. '927, as for changing or modifying these properties by use of *only* these two steps of quantum physics.

Allowable Subject Matter

4. Claims 3, 4, 11, 12, 15, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The relevant prior art of record does not teach or reasonably suggest: that the control paths are *optical fibers or carbon nanotubes* (claims 3 and

19), the control paths are *radio frequency or microwave antennas* (claim 4), the material comprising a *plurality of barrier layers and a transport layer to create a quantum well* (claim 11), the material comprising a *memory* layer to switch energy to a confinement region (claim 12), or embedding the material inside a bulk material, to create a *programmable dopant* (claim 15).

Response to Arguments

5. Applicant's arguments, filed May 12, 2005, have been fully considered but they are not persuasive. Applicant asserts that there is "no comparable disclosure meeting the requirements of § 112 in the '625 (sic Yerushalmi '635) application that forms the basis of the rejections founded on the '927 publication". (see page 2 of Applicant's response dated 5/12/05). The Examiner respectfully disagrees with this vague assertion. The Examiner asserts that the provisional application '635 discloses the subject matter that the rejection relies upon.

6. For example, in the art, the *quantum dot* has been described as " a small piece of a substance having a small size in all three dimensions". A *quantum dot* has only a few discrete states in which it can exist, for example, having one or zero extra electrons, having an excess spin up or down, having its magnetization vector point up or down, or having an electron in its first, second, or higher excited state. A *quantum dot* can be stabilized by gating, optical excitation, or other control devices.

7. The provisional application '635 (to Yerushalmi et al.) explicitly discloses that a molecular engine (ME) may be used "to perform mechanical work at the *molecular level*, alter mechanically the conformation of a substrate molecule, or any other *manipulation at the molecular level*." (see page 5). Also, on page 6 (#3), Yerushalmi et al. '635 discloses a

particular application of the ME, such as its use in charge transfer of chemical or photochemical electron-transfer reactions at the *molecular level.* Finally, on page 18, the '635 application *discusses changing the electronic configuration* of a central nickel (Ni) atom. Clearly, the disclosure teaches applications of the ME for purposes at the quantum mechanical level, and with a quantum dot, as per the quantum dot's general definition in the art. The broad term "fiber shape" is disclosed in schemes 2.a, 2.c, and scheme 3 of the '635 application.

8. It is noted that Applicant's vague traversal leaves the Examiner unsure as to what Applicant feels is missing in the '635 provisional application.

9. As fully addressed above, the '635 provisional application discloses the basis for the Examiner's rejections made in the non-final office action mailed April 22, 2005. As such, the withdrawal of this application from issue by the Office (due to the art to Yerushalmi et al. '927) was proper. Further, Applicant does not discuss the merits of the rejections to claims 1, 2, 5, 6, 9, 10, 13, 14, 16-18, and 20-25. Accordingly, this action is made **FINAL**.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Petkovsek whose telephone number is (571) 272-2355. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Petkovsek
June 6, 2005

John D. Lee
Primary Examiner